Journal of Cases on Information Technology
Volume 26 • Issue 1

Improving English Teaching Strategies From the Perspective of College Students' Mental Health

Xinhui Zhang, City University of Zhengzhou, China*

ABSTRACT

Implementing mental health education (MHE) in schools is vital for students' psychological well-being. Subject infiltration integrates psychological factors into subject learning, promoting healthy development. However, English learning can introduce issues like self-confidence and language anxiety. Early identification of mental health problems (MHP) is crucial. This study, rooted in humanistic psychology and constructivism, explores affective factors, strategies, teaching, and English listening. The algorithm, based on the DeepPsy model, shows promise, identifying 75% of students with MHP. This research aids universities in offering timely support to high-risk students, minimizing long-term harm. The algorithm contributes to a healthier learning environment by enhancing English teaching and addressing mental health issues early.

KEYWORDS:

Mental health, English teaching, Psychological identification, College student

INTRODUCTION

In the 1980s, MHE in colleges and universities in China started and gradually developed. In 2004, the Opinions on Further Strengthening and Improving College Students' Ideological and Political Education issued by the State Council clearly classified MHE into the category of ideological and political education. In higher vocational education, English courses, as continuous courses, are an important part of training advanced English professionals. English courses should not only lay a good foundation for language learning but also focus on improving practical language skills, especially the ability to use English in daily foreign-related communication or transnational business activities. According to the survey of Institute of Psychology, Chinese Academy of Sciences, the mental health level of most urban residents in China is in good condition, but about 20% of respondents still have MHP. At the same time, according to a group of data from China Youth Daily, about 60% of university students have MHP. According to statistics, about 17% of university students suffer from depression of different degrees, about 15% suffer from anxiety disorder, about

DOI: 10.4018/JCIT.342090 *Corresponding Author

10% suffer from pessimism of different levels, and about 10% of university students have certain hatred toward society and even family.

Mental health problems can cause serious harm. MHP can cause some negative effects on individuals, making their adaptability in society worse, and even posing a serious threat to their physical health. The research scope of practice psychology mainly covers the nature of learning, learning process, intellectual factors, and non-intellectual factors in the learning process. Therefore, the subject penetration of MHE plays an irreplaceable positive role in improving students' psychological factors and learning potential in various subjects and has far-reaching research significance.

Most teachers take various high-pressure means to force students to memorize, such as assigning homework to copy new words 5 to 10 times. Playing boards, squatting, push ups, running, standing at the wall, inviting parents, and copying dozens of times have become the most basic punishment methods for underperforming students. Teachers' dignity has become a powerful tool to promote learning, but at the same time, teachers and students often confront each other. This kind of unscientific teaching, which violates the educational principles, lacks rationality and interest and causes teachers to quickly burn out. This learning process is only to strengthen the negative psychological factors of students. The positive psychological factors of learning have not been developed and cultivated, which is not conducive to the healthy growth of students' body and mind.

To build an innovative country, the enhancement of independent innovation ability should be the strategic focus to develop science and technology. By taking the enhancement of independent innovation as the central link of adjusting the industrial structure and changing the growth mode, a resource-saving and environment-friendly society can be built, and the steady development of the national economy can be promoted. The emergence of knowledge economy indicates that human society is stepping into a new economic era based on knowledge resources. At the same time, the new economic revolution will reshape the new pattern of the global economy and will cause comprehensive changes in politics, education, and many other aspects. In the face of the new pattern of the world economy, education is facing new challenges. The quality education of university students is taking more and more responsibility in shaping the problem of urgently needed talents in the era. Therefore, high-level English talents can not only contribute to the overall development of the country and society but also become a powerful force to promote the integration of the world economy. Therefore, English courses show unique value that cannot be replaced by other disciplines. These problems need to be deeply studied and solved, and school MHE can penetrate into the memory of senior high school students' English vocabulary through the research process of problem solving. How to carry out such research more scientifically and effectively is the first problem that must be considered.

College students are in a stage of rapid growth in both physical and psychological aspects. They are full of vitality and passion, but they are emotionally unstable and easily affected by the outside world. They are full of curiosity about all new things, dare to explore and practice, but sometimes they can't control themselves reasonably, and some have extreme egos. They live in a group environment, and in the process of interacting with others, it is easy to have some psychological obstacles, which are troubling their mental health.

By analyzing and optimizing several aspects that restrict the speed of Apriori algorithm in the process of data mining of association rules, this paper improves the mining algorithm of association rules, so as to improve the performance of the mining algorithm, and tries to apply the improved Apriori algorithm of association rules to the research of university students' necessary analysis. Its innovation lies in:

(1) This paper analyzes and summarizes the thought process and performance of Apriori algorithm in association rules, points out the shortcomings of the algorithm, and briefly introduces and compares some improved related algorithms.

(2) Organize the collected data, and then use SPSS statistical software to carry out descriptive statistics, difference test, and regression analysis on the data to reveal the mechanism of psychological factors affecting university students' English learning.

RELATED WORK

In terms of curriculum objectives, some scholars have proposed positive mental health education with the goal of cultivating students' positive psychological quality (Hassan et al., 2023). Starting from the difference between traditional mental health education and modern health education, this education explores how to bring the training objectives of positive psychology into the system of mental health education (Khanna et al., 2023).

Ma et al. (2023) put forward the view that the low sense of achievement, parents' high expectations for children's learning, heavy schoolwork burden, and increasingly difficult learning tasks are the causes of students' learning pressure, learning anxiety, insomnia symptoms, being grumpy, and other psychological problems. Therefore, they agreed that school psychological counseling should focus on learning guidance, reducing learning pressure, and easing learning anxiety. Kuo and Chang (2023) believe that the enhancement of psychological quality can improve the learning effect, which ultimately improves students' cultural and scientific literacy, and they specifically put forward that psychological quality education should be infiltrated into the teaching of various subjects to reduce the learning pressure by stratified teaching and guiding students to learn how to learn. Fan et al. (2023) proposed a new method to predict the future severity of mental illness of users who share posts on Instagram. They surveyed a group of Instagram users who posted content on the pro-eating disorder tag (Batool et al., 2023). According to previous research, Erbeli and Wagner (2023) believe that learners' learning attitude refers to a relatively stable and evaluable internal psychological tendency toward learning activities, which is manifested through three psychological components, namely cognition, emotion, and behavioral tendency.

Mohammadi and Mohammadi (2023) know about research on psychological capital. Under the influence of positive psychology, there are two movements: positive histology and positive organizational behavior (Noetel et al., 2023). Positive histology emphasizes the characteristics that positive organization can effectively improve organizational viability and emphasizes the effectiveness of organization in adverse circumstances. Organizational behavior mainly refers to the research on effective human resource advantages and psychological abilities that have positive orientation and can be measured to improve performance. Nematilloevich (2023) has no unified answer to the definition of positive psychology. After exploring the core of its definition at home and abroad, the author believes that the research core of positive psychology should be based on the positive power and virtue of ordinary people, which is a psychology discipline dedicated to making individuals happy and building a better society. The three-dimensional model of creativity proposed by Ismaili and El Moutaouakil (2023) believe that creativity is composed of three dimensions that are independent and interrelated. The three dimensions are: (1) intelligence dimension; (2) the dimension of intellectual style; (3) personality dimension. Because the degree, composition, and role of the three dimensions are different, it reflects the complexity and diversity of creativity, as well as the strength and depth of creativity.

Knezek et al. (2023) proposed that one of the tasks and functions of active MHE is to focus on the development of various intellectual potential and non-intellectual potential, improve students' learning efficiency to improve their learning situation, and put forward the implementation concept of "full participation" in active MHE. Sann et al. (2023) proposed that positive psychology should be used to guide the value orientation of school MHE. The value orientation is directly related to students' mental health and how schools carry out MHE. The discussion of this issue is an important

enlightenment under the development of positive psychology. Schroeders et al. (2023) should focus on the positive concept of the cultivation of university students' psychological quality in the specific course construction and put the principles of creating a positive curriculum atmosphere and practicing positive MHE into practice throughout.

METHODOLOGY

Research and Analysis on Improving English Teaching Strategies

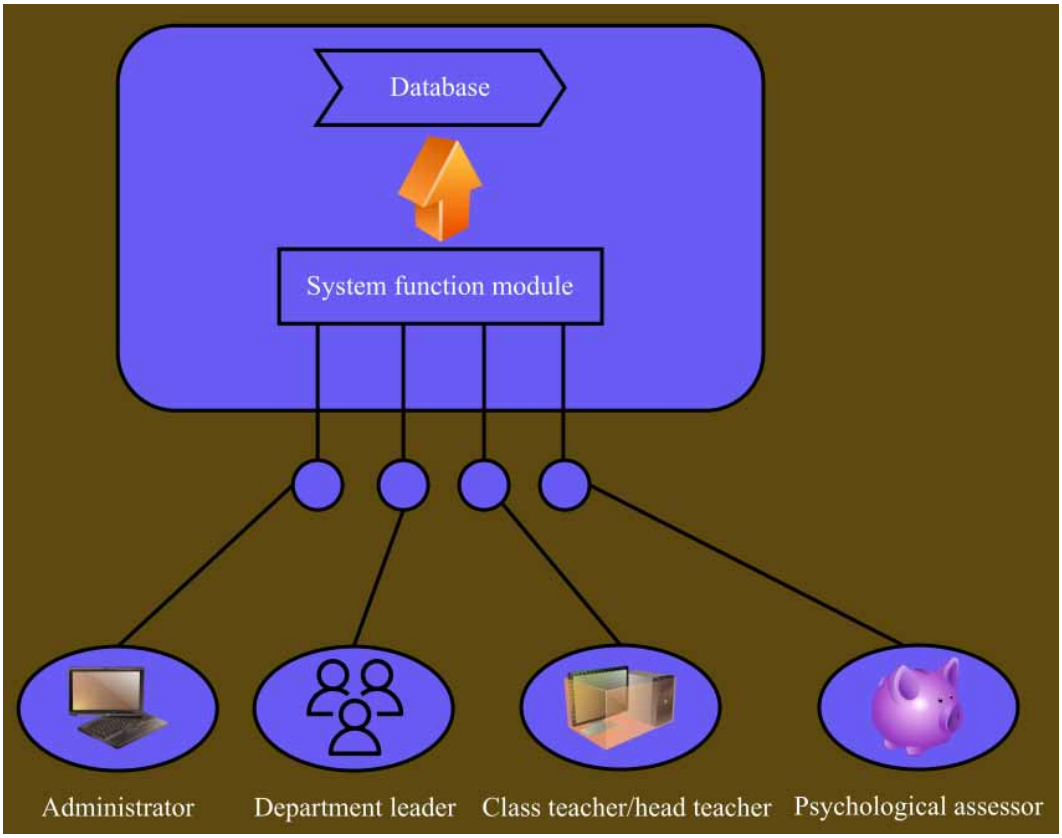
Strong social progress has brought material wealth, which can put a mental strain on people, and all kinds of negative psychology and emotions have emerged (Huatangari et al., 2023). Traditional psychological research that ignores the individual significance of society can't fundamentally solve this problem (Maphosa & Maphosa, 2023). Under this background, the study of positive psychology came into being (Baker et al., 2023). In the limited collection and collation, quite a few books on MHE do not talk about innovation or creativity and other related ideas (Černý, 2023). Moreover, even where the cultivation of innovative psychological quality has been added to the curriculum system of MHE, there are still quite a few MHE textbooks that do not mention innovative psychological approaches (Huang et al., 2023). The problem of psychology not only brings many problems in university students' study and life but it also brings a lot of harm (Neumann et al., 2023). Parents and teachers pay more and more attention to the problem of university students' rationality, and colleges and universities also pay special attention to this problem, increasing the research on university students' rationality. However, most colleges and universities simply strengthen the theoretical education and management, which has not achieved good results. The hidden problems in English teaching are practical problems that need to be solved urgently. The disconnect between theory and practice causes these problems inhibits various factors related to learning psychology to play a full role in developing memory potential and improving memory efficiency. Hidden problems will linger, and vocabulary memory ability will be difficult to improve. This is a problem to be solved by the subject penetration of MHE. The content of subject penetration is extremely rich, covering the solution of all problems. There are many literatures about the application of mental factors, such as intellectual factors and non-intellectual factors, in English learning, but it is hard to find articles about the application of English vocabulary memory.

Learning is a valuable and meaningful psychological process, not the sum of mechanical stimulation and reaction. Only when students correctly understand the value of what they have learned can learning become effective. This change is mainly realized through three mechanisms of individual subjective norms: compliance, recognition, and internalization. Through the detailed analysis of the existing student work flow, the basic needs are determined by asking the counselors and class teachers in the information engineering department, as shown in Figure 1.

The obedience mechanism is when people accept the influence of others or groups in order to get praise and desire to get special rewards or impunity from the influencers (Kang & Kim, 2023). The emergence of any learning behavior requires the participation of psychological activities, while the learning of knowledge and skills is a more complicated process, which requires the active input and participation of learners' intellectual factors, non-intellectual factors, and other psychological factors to achieve results (Odiljanovna, 2023). The hidden problems that have existed for a long time, and they can be addressed by the cultivation of students' learning psychology, the development of memory potential, the cultivation of vocabulary memory habits, the improvement of lifelong learning ability, and the improvement of the unhealthy situation of students' English in teaching practice.

The attitude of teachers is the key to affecting students' English learning, but most English teachers only focus on traditional teaching models and do not have innovative teaching methods to mobilize students' interest and enthusiasm in learning English. The teaching model is relatively fixed. In addition, due to the low salary and job evaluation, teachers do not devote themselves to exploring and researching new teaching models, and to some extent neglect the training of students' abilities.

Figure 1. Multi-Right student management structure diagram

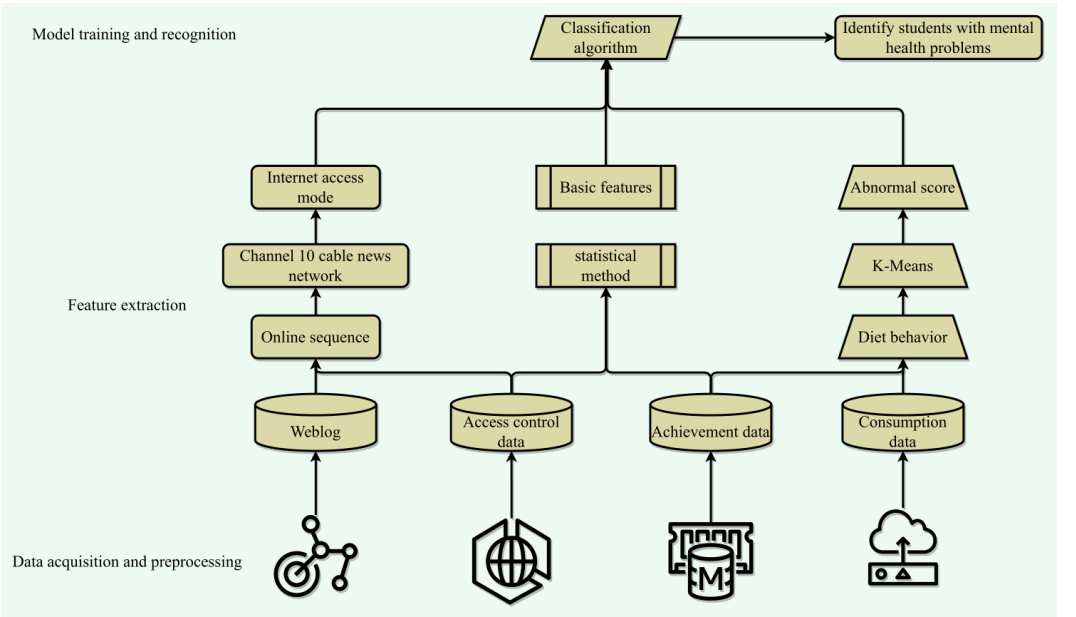


This includes the knowledge and ability of higher vocational students, the cognitive characteristics of students' age groups, the mastery of preview before class, and the students' emotional state of new knowledge to be learned. The teaching starting point formulated in this way has selected symptomatic teaching methods for higher vocational students and used appropriate teaching methods to enable all students to achieve rational development. Pre-class preview can also cultivate students to learn to study independently, put forward difficult problems, and then listen to the class, which is beneficial to the cultivation of students' learning tenacity. The ecosystem theory mentioned earlier clarifies that the cultivation of teachers' abilities in English practical tasks needs to rely on the construction of the student ecosystem. Students will have thoughts, feelings, and deep questions in the preview process. If teachers design teaching plans in a targeted way, it will help to explore the heuristic teaching mode.

Improving English Education Ability From the Perspective of Data Mining and Mental Health

People began to devote themselves to mining some potential information from these massive data, which led to a variety of data mining technologies (Asad et al., 2023). Among them, education data mining is a new technology born in order to make full use of the huge data stream in the operation process of digital campus (Xu et al., 2023). Through the comprehensive utilization of various data mining technologies, a large number of data are integrated, classified, refined, etc., giving it application value in the continuous development and innovation of education (Tetzlaff et al., 2023). At present, there are certain differences in the educational systems of various universities. The formats or fields

Figure 2. Algorithm framework for identifying students' MHP based on multi-score data



of recorded data in different educational systems are often different, and the frequency and time interval of data collection may also be different, which makes the unification of educational data mining technology a great challenge. For the network log data, because there are a lot of noise data in the data, it is necessary to eliminate the noise data according to the request URL. At the same time, because there are too many URL types of weblogs, they are unified into seven categories, as shown in Figure 2.

By selecting some relevant factors, we can obtain an enrollment and management evaluation system then mine the collected data to find some rules with practical significance hidden in these data, and then apply the obtained conclusions to the actual college health education, which is of great significance to the healthy development of university students. In order to facilitate data mining, we need to convert these data before mining association rules, discretize continuous data, and classify discrete data. According to the SOL-90 method, the score of which psychological factor is greater than or equal to 1 when the score method of 0-4 is adopted, and the score of which psychological factor is greater than or equal to 2 when the score method of 1-5 is adopted, which indicates that there is a problem with that psychological factor. Therefore, we can classify each psychological factor into two types, symptomatic and asymptomatic, which are represented by 1 and 0, respectively. The subordination and coding of psychological attributes are shown in Table 1, and there are seven attributes including basic information and psychological symptoms. According to this vertical attribute, we can establish the corresponding data table and then process and analyze the data according to the selected research objectives.

There are seven factors related to university students' analysis. We can preprocess this group of data according to the specific mining needs to better improve our mining efficiency and accuracy. We can define x_1 for gender, x_2 for major, x_3 for grade, and x_{12} for mental illness. Then the sample information of a university student is recorded as a 12-dimensional coordinate point, and all data information is a collection of A_i.

Table 1. Psychoanalysis attributes and coding

Attribute	Attribute value	Converted code
Specialized subject	Literature and history	Mj0
	Engineering class	Mj1
	Art and sports	Mj2
Grade	Low grade	Gd0
	Senior class	Gd1
Somatization	Asymptomatic	Qt0
	Symptom	Qt1
Interpersonal sensitivity	Asymptomatic	Qp0
	Symptom	Qp1
Depressed	Asymptomatic	Mg0
	Symptom	Mg1
Anxious	Asymptomatic	Yy0
	Symptom	Yy1
Hostile	Asymptomatic	J10
	Symptom	J11

$$A_i = (x_1, x_2, x_3, ..., x_{12}) \tag{1}$$

In this way, we can limit the value range of one item, x_i, to conduct correlation mining analysis on other factors after a certain factor is determined. For example, by ordering $x_2 = mj1$, we can get the survey data set f for science and engineering students.

$$f = \sum_t (A_i \left| x_2 = mj1 \right.) \tag{2}$$

In the same way, we can obtain different types of information related to philosophy by setting other conditions, and we can also set two conditions at the same time, and of course, we can also set multiple conditions at the same time to make more restrictions, thus reducing the dimension of space. For example, we can set x_2 and x_3 at the same time, and we can get the survey data of f' of junior science and engineering majors.

$$f' = \sum_i (A_i \left| X_2 = mj1 \cap X_3 = gd0 \right.) \tag{3}$$

Of course, we can also limit x_3, and we can also get the survey data of science and engineering majors in junior grades. The method of setting multiple factor values for association analysis will not be repeated in the delivery.

$$f' = \sum_{i} (A_{i} \left| A_{i} \in f \cap x_{3} = gd0 \right.) \tag{4}$$

By simply limiting the information processing, we can reduce the investigation space and then use the algorithm to mine the association rules of the data. On the one hand, we can study the relationship between certain factors. On the other hand, we can get the information we need more accurately, which makes the purpose of research clearer.

In the specific implementation process of the whole research plan, these tasks should be carried out step by step: training the research participants to master the preparation methods and survey methods of the questionnaire, the preparation requirements and test methods of the vocabulary test paper, data statistics and analysis methods, the operation methods of the new model, the contents and methods of observation in and out of the classroom, and the writing methods of the paper report. Compile all data according to the method. If it is feasible, it can continue to run in the mode; otherwise, it will be deleted or modified, or the whole mode may be greatly or thoroughly adjusted or modified, and the experiment will be carried out on the basis of the modification.

In addition, some higher vocational colleges pay attention to the evaluation of cultural communication skills, which is an important part of formative evaluation. Learners can evaluate their learning results combined with modern psychological research findings. The evaluation system of English curriculum for vocational university students still ignores the process of listening learning, pays attention to listening and speaking skills, and does not pay attention to the evaluation of listening and speaking skills, and the evaluation validity is not high. In the overall evaluation system, the quantitative test of English knowledge and skills is still the main method, and the score of mechanical learning knowledge for students to master English determines their main learning level. This evaluation system is more traditional, mainly based on one-time large-scale tests. The mode of English learning of vocational university students is still the traditional teaching mode that an English teacher focuses on during teaching.

An Improved Matrix Based Apriori Algorithm

The matrix based Apriori algorithm is an algorithm used for mining association rules. Its goal is to identify frequently occurring itemsets in the dataset and generate association rules based on these itemsets. In the matrix based Apriori algorithm, we first create a two-dimensional matrix where each row represents a transaction, and each column represents an item. The elements in a matrix can be Boolean values, used to indicate whether a certain item appears in the corresponding transaction. The main steps of the algorithm are as follows:

(1) Initialize candidate itemset: Use all different items as initial values for the candidate itemset and set their count to 0.
(2) Traverse the dataset: For each transaction, mark the position of the corresponding item in the matrix.
(3) Filter candidate sets based on minimum support: Calculate the support (i.e. frequency of occurrence) of each candidate itemset in the dataset, and remove itemsets with support below the threshold.
(4) Generate new candidate itemset: Generate a new candidate itemset by combining frequent itemsets.
(5) Repeat steps 2 to 4 until a new candidate itemset cannot be generated.
(6) Filter association rules based on minimum confidence: For each frequent itemset, generate association rules and calculate their confidence (i.e. the trustworthiness of the rules). Remove rules with confidence levels below the threshold.
(7) Output frequent itemsets and association rules.

The matrix based Apriori algorithm improves the efficiency of the algorithm by using matrices to store data and representing the occurrence of itemsets in transactions using Boolean values. It is an optimization form of the Apriori algorithm that can reduce memory consumption and computation time when processing large-scale datasets.

The study of university students' physical health has always been considered one of the important topics by many practitioners and educators of science. In the university campus, apart from studying professional cultural courses, all kinds of problems will have a negative impact on university students' health after they leave their parents' company. In this paper, the idea of parallelization is combined with the idea of itemset sorting on the basis of the basic weakness of PMApriori algorithm based on Boolean matrix.

When scanning the entire transaction set, try to divide the transaction database when the transaction database is large, and the time spent scanning the database is greatly reduced. By bitwise "operating" the row vectors corresponding to two connected itemsets, multiplying them by the weights in the array w, and finally summing them up, the support count of the connected itemsets can be obtained. Then, the obtained support count is compared with the minimum support count, and the row direction denier corresponding to the result less than the minimum support count is deleted.

We hope to mine the online mode of students from the online time series. In recent years, one-dimensional convolutional neural network has been widely used in feature extraction of time series. For example, the time series analysis of sensor data, the analysis of audio signal sequence, and the ability to handle natural language tasks. However, the confusion matrix is only statistical quantity, and when the number of samples processed is very large, it is difficult to evaluate the performance of the model only by counting the quantity. In education data research, there are five commonly used evaluation indicators, namely, accuracy rate, recall rate, F1 guarantee, and authentication centre.

In this experiment, we choose precision, recall, and F1 measure as evaluation indicators. Next, we will introduce the specific meanings of these evaluation indicators in detail. Accuracy rate:

$$\Pr ecision = \frac{TP}{TP + FP} \tag{5}$$

$$\mathrm{Re}\, call = \frac{TP}{TP + FN} \tag{6}$$

When it is equal to 1, it is commonly used F1-Measure. In this study, we use F1-Measure.

$$F - Measure = \frac{(a^{2+1})\Pr ecision * \mathrm{Re}\, call}{a^{2} * \Pr ecision + \mathrm{Re}\, call} \tag{7}$$

The training process of the model is the process of parameter selection, and how to select the optimal parameter is a key problem. In this algorithm, we use permutation and combination to select the optimal parameter combination. For each classification algorithm (KNN), we only adjust a few important parameters, and the remaining parameters use default values. After trying different parameter combinations, we selected the best parameter combination of each candidate KNN.

Rows are logically AND-operated with other rows in sequence, and then weighted with array W, for example, $A \wedge B = 0010$, weight $w = \begin{bmatrix} 1 & 1 & 1 & 1 \end{bmatrix}$, support count $\sup\_count\{AB\} = 0 \times 1 + 0 \times 1 + 1 \times 1 = 1 <$. If the minimum support count is M_1, the row

vector will be discarded. After the calculation, keep those row vectors whose weighted sum is greater than or equal to the minimum support count. These saved clever vectors are the corresponding frequent 2-item set L_2, and the new matrix composed of them is recorded as M_2.

$$M_2 = \begin{bmatrix} AC\,1 & 0 & 1 & 0 \\ BC\,0 & 1 & 1 & 0 \\ BE\,0 & 1 & 1 & 1 \\ CE\,0 & 1 & 1 & 0 \end{bmatrix} \tag{8}$$

Scan matrix M_2, 2-itemsets $\{A,C\}$, and $\{C,E\}$ cannot be connected with adjacent itemsets $\{B,C\}$ and $\{C,E\}$, so delete 2-itemsets and corresponding row vectors. The remaining vectors are recombined into matrix $\{A,C\}$, and array $\{C,E\}$ 1 also changes accordingly M_2.

$$M_2 = \begin{bmatrix} BC\,0 & 1 & 1 & 0 \\ BE\,0 & 1 & 1 & 1 \end{bmatrix} \tag{9}$$
$$m = \begin{bmatrix} 0 & 2 & 2 & 1 \end{bmatrix}$$

By tracing the array m, it is found that the corresponding value of the first column in the array m is less than 1. Therefore, the corresponding column vector of this column in the matrix M_2 is deleted, and the remaining column vectors are recombined into a new matrix M'_2. Of course, the array m will change accordingly.

$$s(X \Rightarrow Y) = \frac{\sigma(X \cup Y)}{M} \tag{10}$$

$$c(X \Rightarrow Y) = \frac{\sigma(X \cup Y)}{\sigma(X)} \tag{11}$$

The itemset $\{B,C,E\}$ corresponding to the retained row vector is the frequent 3-itemset L_3. Because the number of rows of M_3 is 1, which is less than $K+2=4$, the algorithm terminates and jumps out of the loop. The largest frequent itemset is the frequent 3- itemset $\{B,C,E\}$.

RESULT AND ANALYSIS

Analysis of Experimental Results

Through the observation of teaching practices, we can find that there are many problems in senior high school students' English vocabulary memory. These problems are considered to exist naturally because they have been commonplace for a long time, and have not attracted attention and thought or have not been deeply studied and solved due to the limitations of objective conditions. However, this innovation need is still a potential driving force. After the innovation incentives appear, the

Table 2. Experimental results under different transaction databases

Number of transactions	500	1000	1500	2000	2500	3000	3500
Apriori	360	620	887	1400	1680	2107	2335
CM_Apriori	10.354	15.456	18.456	23.215	30.55	36.45	44.26
PMApriori	6.224	10.265	16.274	26.565	33.121	36.452	38.264
MTCA algorithm	5.653	9.254	14.465	19.563	23.45	30.56	32.441

potential innovation drive is activated. It becomes the power to directly promote innovation activities, namely innovation motivation. Psychological health education helps individuals to deeply understand, experience the social and historical significance of innovation, correctly understand self-value, break the mystery of innovation, overcome the sense of inferiority in self-evaluation, establish innovation awareness, cultivate individuals' correct cognition of innovation activities, stabilize innovation goals, give full play to innovation potential, activate innovation needs, cultivate innovation desire, and form innovation motivation through systematic classroom explanations, specific practical guidance, and other forms.

We can clearly see that the running time of other matrix-based improved Apriori algorithms is greatly reduced compared with the original Apriori algorithm, and the running time of the original Apriori algorithm increases linearly with the number of transactions. When the four algorithms are compared in a graph, the improved algorithm is very close to the horizontal coordinate axis, which is difficult to distinguish. Compared with PMApriori algorithm, MTCA algorithm uses multi-thread to transform from item set to Boolean matrix, and adds itemset sorting in the process of finding frequent itemsets, which reduces the generation of many infrequent item candidate sets in the iterative process. As the number of transactions increases, the advantages of parallel operation and sorting will become more and more obvious. The running time of MTCA algorithm is less than that of PMApriori algorithm. As shown in Table 2, Figure 3, and Figure 4.

Figure 3. Comparison diagram of four algorithm tests

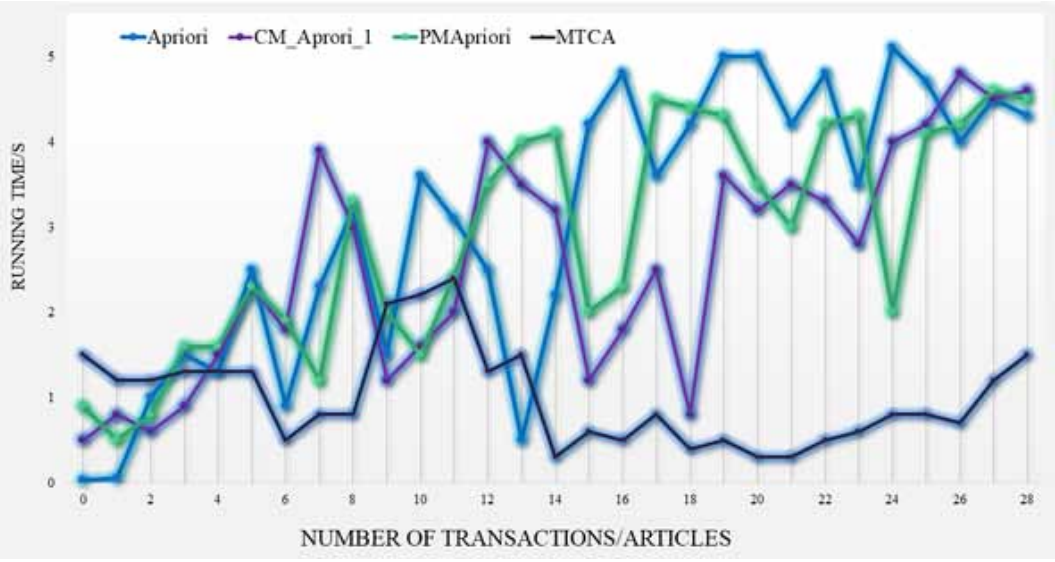
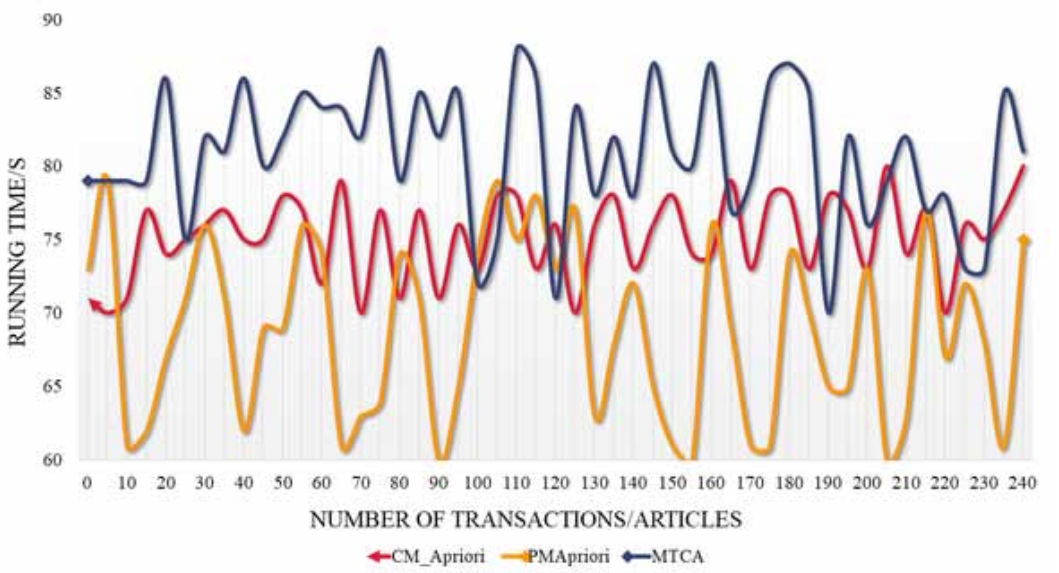


Figure 4. Comparison of three improved algorithms



After the data is preprocessed, we can use the improved algorithm and combine the ideas of the above constructed university students' theoretical correlation analysis system to conduct correlation analysis on our mining goals, find out the potential links between the set factors, and then conduct psychological health education for university students according to the results. In the future research process, we should continue to deepen the research. Although there is no revolutionary innovation in the information we have mined, the combination of association rule mining, university students' axiomatic analysis, and the application of algorithms in real life to guide life is itself a kind of research and exploration, which requires us to improve step by step, until we find a better method. The sample data in the training set and the test set have characteristics and labels, but their functions are different. The process of machine learning is generally divided into two stages. In the first stage, training samples are input into the model for model training. In the second stage, input test samples to test the generalization ability of the model, as shown in Figure 5.

The statistics of the results of the post test of this questionnaire are shown in Figure 6. The average number of students with 10 choices of B, C, and D accounts for 84.86%, which shows that the model has obvious effects on solving the implicit problems in senior high school students' English vocabulary memory. The penetration of MHE has played a positive role, and the unfavorable situation of learning psychology has been greatly improved. These changes are consistent with the results of vocabulary tests.

English teachers can improve students' English ability by carrying out effective activities to cultivate students' English ability in the classroom. But the actual survey shows that students are not improving their English learning attitude in cognition. The survey results show that the improvement of students' English ability contributes to the improvement of individual comprehensive English ability, and 95% of them think it is very helpful, 28.7% think it is relatively helpful, 15.3% think it is average, and 17.3% think it is not very helpful. This is related to students' knowledge of English ability and whether teachers carry out relevant teaching strategies in daily life. The improvement of English learning attitude has less influence on whether students' English grades are helpful or not. It can be seen that, for 58.7% of students, the lack of awareness of English ability among vocational students in classroom teaching directly affects the teaching progress of teachers in effectively developing English ability, as shown in Figure 7.

Figure 5. Proportion of each mental state in the data set

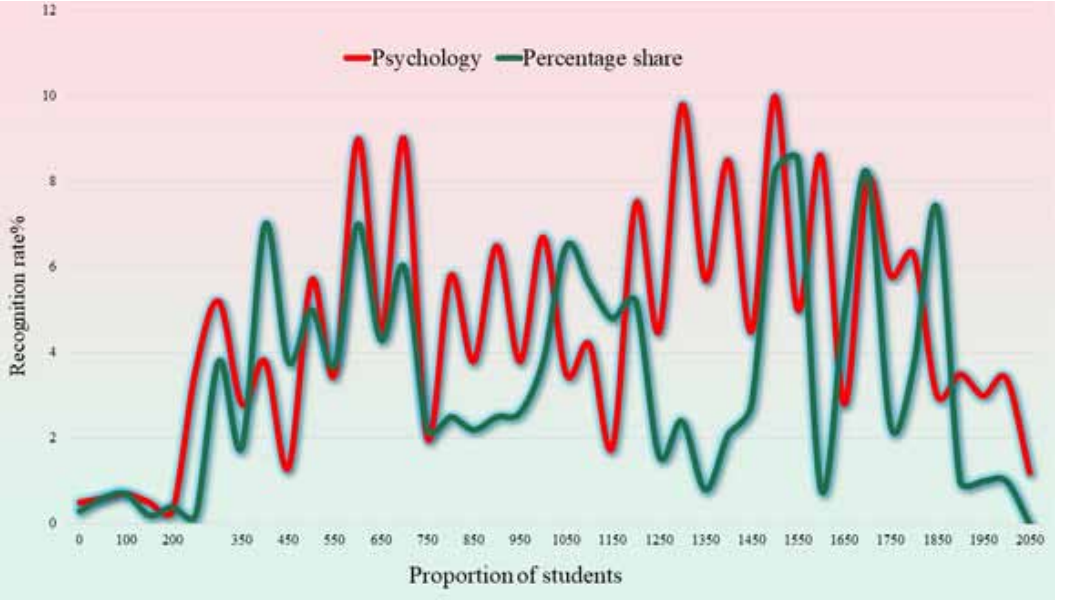
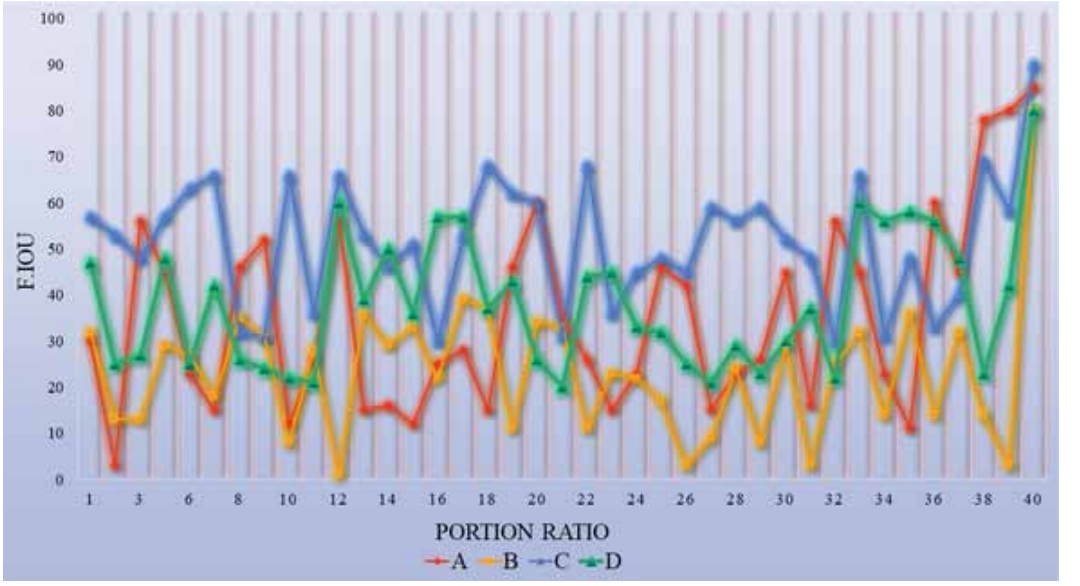
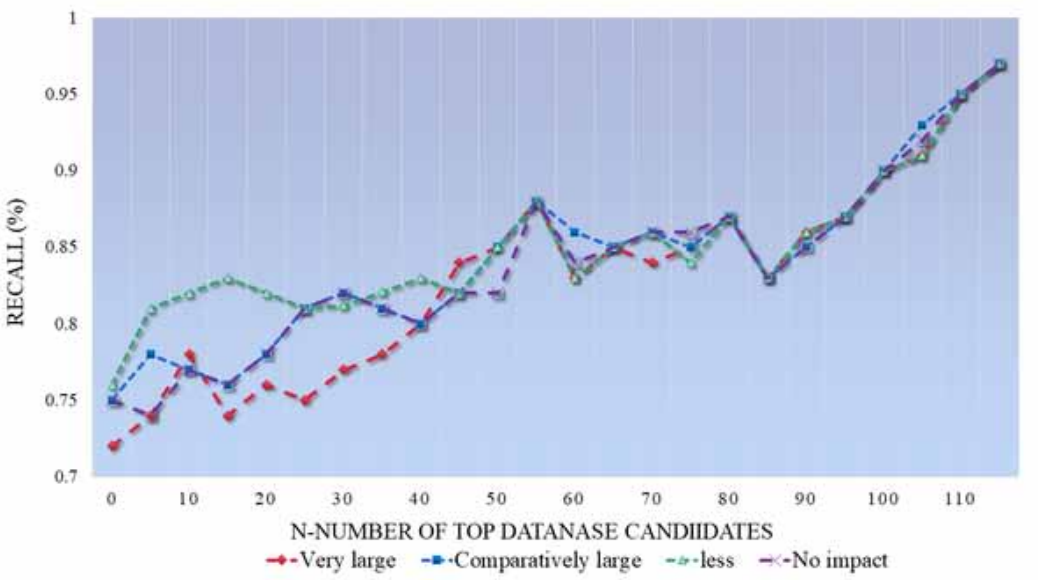


Figure 6. Significant improvement of learning disabilities



However, in the education system, the application of core literacy in practical activities has a vague function. Especially in English teaching, there are few teaching activity models for teachers to carry out English learning attitudes in combination with practice, mainly because the specific functions of core literacy practical education activities are vague, which has become a phenomenon of less English application ability in higher vocational English. After effective training of English teaching strategies, vocational university students' English ability can be improved, but it is

Figure 7. Survey of students' help in evaluating english ability to improve their English performance



difficult to rely solely on students' independent development of English ability. Most students' understanding of English ability is unclear. Under the premise that English teachers have few class hours, there is a great pressure to cultivate students' attitude toward English learning in higher vocational colleges. In the process of learning English, students can't grasp the concept of attitude toward learning English clearly.

Analysis of Practical Applications

College students, as a dynamic and passionate group, are in a stage of rapid physical and mental growth. However, this stage is also accompanied by issues such as emotional instability and susceptibility to psychological disorders, which pose challenges to their mental health. A study on the impact mechanism of psychological factors on English learning among college students attempts to solve this problem through an improved association rule mining algorithm, but inevitably faces some limitations that need to be further discussed in the exploration.

(1) Sample selection limitation: The research results of this article are only based on a specific sample group and may not fully represent the situation of all college students. Due to time and resource limitations, researchers may only be able to select a small number of students from schools or regions for the survey, so the universality of the research results needs further verification. In order to improve the universality of research results, more schools and regions can be selected to conduct surveys on college students in order to have a more comprehensive understanding of their physical and mental health.
(2) Data collection methods: This article used SPSS statistical software to conduct descriptive statistics, difference tests, and regression analysis on the data. However, the results of the software may be influenced by data quality and analysis methods. Future research can consider using various data collection methods, such as questionnaire surveys, in-depth interviews, etc., to obtain more comprehensive and accurate data.

(3) Result interpretation: This article aims to reveal the mechanism by which psychological factors affect college students' English learning but does not involve specific explanations or theoretical frameworks. Further research can combine relevant theories to analyze and explain the research results in depth in order to increase the credibility and persuasiveness of the research.
(4) Limitations of algorithm improvement: This article proposes an improved association rule Apriori algorithm and applies it to the study of necessary analysis for college students. However, the improved algorithm may still have some limitations, such as applicability and computational efficiency. Future research can further optimize algorithms to improve their performance and applicability.

In summary, although this article has made certain innovations and contributions in exploring the physical and mental development and mental health issues of college students, there are still some limitations that need further discussion and resolution. These limitations may have a certain impact on the interpretation and application of research results, so readers should pay attention to and consider them when reading and citing this paper.

The research results of this article have important practical significance for the mental health and physical and mental development of college students. Firstly, by improving the association rule mining algorithm, it is possible to better discover the impact mechanism of psychological factors on English learning among college students, which helps schools and educational management departments to develop targeted psychological health interventions and improve the learning effectiveness and mental health level of college students. Secondly, regarding the mental health issues of college students, research results can also provide scientific data support for schools and society, promoting the development of mental health education and psychological counseling services. By analyzing the psychological health status and influencing factors of college students, targeted psychological health education activities can be carried out to strengthen their psychological adaptability and prevent and reduce the occurrence of psychological problems. In addition, the improved association rule mining algorithm can also be applied in other fields, such as marketing, healthcare, etc., to discover potential correlations between variables and provide a basis for decision-making. Overall, the research findings of this article can not only provide scientific basis and solutions for the mental health problems of college students but also have broad application prospects, helping to promote the development and progress of related fields. The future development in this research field can be expanded in the following directions:

(1) Interdisciplinary research: It can combine knowledge from multiple disciplines such as psychology, education, and computer science to deeply explore the impact mechanism of psychological factors on learning among college students and develop more effective algorithms and models to reveal potential association rules.
(2) Multi-perspective analysis: In addition to psychological factors, other factors such as social factors and family environment can also be considered to comprehensively analyze the impact on the learning and mental health of college students in order to obtain a more comprehensive understanding.
(3) Empirical research and practical application: Applying research results to actual school education management and mental health services, conducting empirical research, verifying the effectiveness of improved algorithms, and actually promoting the improvement of mental health and academic performance of college students.
(4) Utilizing big data technology: Combining big data technology and artificial intelligence algorithms, mining more hidden patterns and information in the data, providing more accurate predictions and intervention strategies for the mental health and learning of college students.

(5) Long term tracking research: Establish a long-term tracking research mechanism to track changes in the mental health and learning status of college students, explore the impact pathways of long-term psychological factors on learning, and provide a basis for formulating sustained and effective intervention measures.

By continuously expanding research fields, integrating interdisciplinary resources, and combining empirical research with practical applications, future research can better promote the improvement of mental health and learning quality of college students, providing stronger support for their comprehensive development and growth.

CONCLUSION

In order to understand the current situation of English learning of higher vocational students, this study compiled a questionnaire from the psychological perspective with the help of literature research. The perspectives of learning attitude, psychological capital, and learning environment were chosen to analyze the current situation of English learning. Mental health education in colleges and universities only focuses on consulting and activities. Even if mental health courses are offered in some colleges and universities, most of these courses are in the form of public elective courses. Generally speaking, the communication of university students' MHE is passive, and the scope of communication is small. Based on this background, this study explores the classroom education of mental health.

Because the formation of innovative ability is a process of internalizing external knowledge, curriculum education is a process of input. The establishment of curriculum education can ensure the universality and effectiveness of the cultivation of innovative psychological quality. Based on this background, this paper applies an improved Apriori association rule mining algorithm to university students' private correlation analysis, and finds potential valuable information. By concretizing and simplifying complex abstract problems, we begin to explore and experiment in relatively certain aspects to find more valuable information and more effective research methods, thereby achieving fuzzification and visualization of research data. This method provides new ideas and possibilities for future research, which helps to promote the progress and development of mental health education for college students.

DATA AVAILABILITY

The figures used to support the findings of this study are included in the article.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

FUNDING STATEMENT

This work was not supported by any funds.

ACKNOWLEDGEMENTS

The authors would like to show sincere thanks to those techniques who have contributed to this research.

REFERENCES

Asad, R., Altaf, S., Ahmad, S., Mahmoud, H., Huda, S., & Iqbal, S. (2023). Machine learning-based hybrid ensemble model achieving precision education for online education amid the lockdown period of COVID-19 pandemic in Pakistan. *Sustainability (Basel)*, *15*(6), 5431. doi:10.3390/su15065431

Baker, B., Mills, K. A., McDonald, P., & Wang, L. (2023). AI, concepts of intelligence, and chatbots: The "figure of man," the rise of emotion, and future visions of education. *Teachers College Record*, *125*(6), 60–84. doi:10.1177/01614681231191291

Batool, S., Rashid, J., Nisar, M. W., Kim, J., Kwon, H. Y., & Hussain, A. (2023). Educational data mining to predict students' academic performance: A survey study. *Education and Information Technologies*, *28*(1), 905–971. doi:10.1007/s10639-022-11152-y

Černý, M. (2023). educational psychology aspects of learning with chatbots without artificial intelligence: Suggestions for designers. *European Journal of Investigation in Health, Psychology and Education*, *13*(2), 284–305. doi:10.3390/ejihpe13020022 PMID:36826206

Erbeli, F., & Wagner, R. K. (2023). Advancements in identification and risk prediction of reading disabilities. *Scientific Studies of Reading*, *27*(1), 1–4. doi:10.1080/10888438.2022.2146508 PMID:36590181

Fan, B., Yao, J., Lei, D., & Tong, R. (2023). Representation, mining and analysis of unsafe behaviour based on pan-scene data. *Journal of Thermal Analysis and Calorimetry*, *148*(11), 5071–5087. doi:10.1007/s10973-022-11655-3 PMID:36245855

Hassan, M. M., Zaman, S., Mollick, S., Hassan, M. M., Raihan, M., Kaushal, C., & Bhardwaj, R. (2023). An efficient Apriori algorithm for frequent pattern in human intoxication data. *Innovations in Systems and Software Engineering*, *19*(1), 61–69. doi:10.1007/s11334-022-00523-w

Huang, Y., Su, Y., Byun, Y., Lee, Y., & Kim, S. (2023). Analysis of multiple chronic disease characteristics in middle-aged and elderly South Koreans by exercise habits based on association rules mining algorithm. *BMC Public Health*, *23*(1), 1232. doi:10.1186/s12889-023-16099-4 PMID:37365542

Huatangari, L. Q., Ríos, M. A. C., & Camones, R. T. H. (2023). Segmenting the eating behaviour of university students using the K-means algorithm. *Bulletin of Electrical Engineering and Informatics*, *12*(4), 2363–2371. doi:10.11591/eei.v12i4.4543

Ismaili, J., & El Moutaouakil, K. (2023). D-learning and COVID-19 crisis: Appraisal of reactions and means of perpetuity. *SN Computer Science*, *4*(3), 290. doi:10.1007/s42979-023-01726-z PMID:37008798

Kang, S. J., & Kim, S. K. (2023). User interface-based repeated sequence detection method for authentication. *Intelligent Automation & Soft Computing*, *35*(3), 2573–2588. doi:10.32604/iasc.2023.029893

Khanna, L., Singh, S. N., Kumar, R., & Alam, M. (2023). Analysis of dependence of grade point average over psychological factors incorporating advanced data mining. *International Journal of Intelligent Enterprise*, *10*(1), 31–47. doi:10.1504/IJIE.2023.127235

Knezek, G., Gibson, D., Christensen, R., Trevisan, O., & Carter, M. (2023). Assessing approaches to learning with nonparametric multidimensional scaling. *British Journal of Educational Technology*, *54*(1), 126–141. doi:10.1111/bjet.13275 PMID:37035265

Kuo, Y. C., & Chang, Y. C. (2023). Adaptive teaching of flipped classroom combined with concept map learning diagnosis-an example of programming design course. *Education and Information Technologies*, *28*(7), 8665–8689. doi:10.1007/s10639-022-11540-4

Ma, Y., Wang, L., Zhang, J., Liu, F., & Jiang, Q. (2023). A personalized learning path recommendation method incorporating multi-algorithm. *Applied Sciences (Basel, Switzerland)*, *13*(10), 5946. doi:10.3390/app13105946

Maphosa, V., & Maphosa, M. (2023). Artificial intelligence in higher education: A bibliometric analysis and topic modeling approach. *Applied Artificial Intelligence*, *37*(1), 2261730. doi:10.1080/08839514.2023.2261730

Mohammadi, T., & Mohammadi, B. (2023). Neuropsychological features in children and adults with congenital heart disease: An exploratory data analysis. *Psychology Health and Medicine*, *28*(3), 693–706. doi:10.1080/13548506.2022.2147558 PMID:36377086

Nematilloevich, U. A. (2023). Methodology for developing professional competence of students using digital technologies in practical training. *Journal of Survey in Fisheries Sciences*, *10*(2S), 1355–1362.

Neumann, M., Niessen, A. S. M., Hurks, P. P., & Meijer, R. R. (2023). Holistic and mechanical combination in psychological assessment: Why algorithms are underutilized and what is needed to increase their use. *International Journal of Selection and Assessment*, *31*(2), 267–285. doi:10.1111/ijsa.12416

Noetel, M., Parker, P., Dicke, T., Beauchamp, M. R., Ntoumanis, N., Hulteen, R. M., Diezmann, C., Yeung, A., Ahmadi, A., Vasconcellos, D., Mahoney, J., Datta, P., Doidge, S., & Lonsdale, C. (2023). Prediction versus explanation in educational psychology: A cross-theoretical approach to using teacher behaviour to predict student engagement in physical education. *Educational Psychology Review*, *35*(3), 73. doi:10.1007/s10648-023-09786-6

Odiljanovna, N. N. (2023). Modern issues of the integration of pedagogy and psychology into the educational process of higher educational institutions. *International Journal of Pedagogics*, *3*(04), 66–70. doi:10.37547/ijp/Volume03Issue04-12

Sann, R., Lai, P. C., & Liaw, S. Y. (2023). Understanding customers' insights using attribution theory: A text mining and rule-based machine learning two-step multifaceted method. *Applied Sciences (Basel, Switzerland)*, *13*(5), 3073. doi:10.3390/app13053073

Schroeders, U., Scharf, F., & Olaru, G. (2024). Model specification searches in structural equation modeling using Bee Swarm Optimization. *Educational and Psychological Measurement*, *84*(1), 40–61. doi:10.1177/00131644231160552 PMID:38250510

Tetzlaff, L., Edelsbrunner, P., Schmitterer, A., Hartmann, U., & Brod, G. (2023). Modeling interactions between multivariate learner characteristics and interventions: A person-centered approach. *Educational Psychology Review*, *35*(4), 112. doi:10.1007/s10648-023-09830-5

Xu, J., Ding, X., Ke, H., Xu, C., & Zhang, H. (2023). Student behavior prediction of mental health based on two-stream informer network. *Applied Sciences (Basel, Switzerland)*, *13*(4), 2371. doi:10.3390/app13042371